



the eeeluminator

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entrepreneurs for energy efficiency

Our mission: to promote successful commercialization of energy efficient technologies developed with the support of the Department of Energy's Inventions & Innovation Program

General Vortex HTC Energy Forum leads to HBJ article



plants. In 2003, the Office of Naval Research gave General Vortex \$100,000 to construct a 30-kilowatt prototype of the engine. Test results impressed the navy so much that they upped the ante for a larger version. General Vortex recently received a \$1 million grant to produce an upgraded 125-kilowatt prototype engine that will undergo more extensive tests at a Navy facility.

The Jirnov engine was invented and patented by Russian scientist Alexei Jirnov in collaboration with group of colleagues that included Anatoli Borissov. Both Jirnov and Borissov came to the United States around 1990 and continued their research at the University of Houston. General Vortex was formed in 1994 by Borissov, his brother Alexander, and Ken Kramer, a self-described "serial entrepreneur" with a degree in mechanical engineering from Rice University. The partners launched the startup to develop and commercialize the four patented technologies for separate components of the Jirnov Vortex Turbine.

Early on, the company received a \$155,000 research grant from the Texas Council of Environmental Technology for developing a combustion chamber technology that exceeded the council's targets for fuel efficiency and emission reduction. That was followed by the \$100,000 grant from the Navy to build the small prototype engine, and the \$1 million now being used to duplicate the engine on a larger scale. If the 125-kilowatt engine exceeds performance standards along the lines of the first prototype, General Vortex could receive a purchase order and a \$3 million grant from the Navy to establish a production facility.

<http://houston.bizjournals.com/houston/stories/2005/01/10/story1.html>

Navy funds power engine project

Small-scale success spurs development of potent turbine made by Russian scientists

E-3 member, Ken Kramer, was featured in a January 7, 2004 article in the *Houston Business Journal*, reported by Monica Perin.

A team of Russian scientists and a Houston entrepreneur hope to develop a revolutionary new engine with a fresh round of funding from the U.S. Navy. Principals of General Vortex Energy Inc. claim their creation will burn any kind of fuel — liquid, gas, or biowaste — at twice the efficiency of other engines. And at the same time, emissions are sharply reduced. The patented Jirnov Vortex Turbine engine, they contend, could one day replace most of the internal combustion engines and gas turbines that power everything from cars to air conditioners to electricity generation



E-3 2005 Annual Meeting

April 27, 2005 Washington, D.C.

Marriott Key Bridge 1401 Lee Highway, Arlington VA



WATERMARK LICENCE

SAI Global hereby grants to:

**Advanced Conservation Technology Inc.
Trading As: ACT Inc. Metlund Systems**

3176 Pullman St. Suite 119 Costa Mesa CA 92626 USA

And

EMS Sandberg Industries Inc

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Manufactured to:

ATS 5200.464 - Technical Specification for plumbing and drainage products - Hot water manual or sensor-activated pumping systems

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Alex Ezrakhovich - General Manager Certification
For and on behalf of SAI Global

Certified Date: 12 November 2004

Expiry Date: 11 November 2009

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FORM 0010 - CERTIFICATE OF MARK LICENSING

Act Inc. Metlund Systems Supplies Metlund D'Mand Hot Water Distribution Systems to Australia And New Zealand.

ACT Inc. D'MAND Systems is an emerging technology firm from the I & I grant program. The original grant was to study a "Recovery Hot Water System" that saved energy by returning hot water that was trapped in the line after hot water was used by the residential home owner. In 1990 the Hot water D'MAND System was created to save energy and water by electronically pumping the hot water to the fixture on the demand of the user.

The Metlund D'MAND Systems is a process of moving the hot water to the fixtures in the home or business without the loss of water down the drain. In existing homes the cold water in the hot water line is rapidly transferred back into the water heater by reversing the cold water line. This occurs only on the demand of the user. Activation can be by buttons, motion sensors, flow switches, and in June of 2005, introducing "Voice Activation". The electronics and sensor built into the D'MAND System operates on a Delta-T or rise of temperature and once hot water is in the line, the D'MAND System will not reactivate.

For new home or commercial construction Metlund D'MAND Systems are designed into the home or business through a procedure called "STRUCTURED PLUMBING". www.gothotwater.com

Over 50,000 Metlund D'MAND Systems have been sold and distributed in the US and Canada, since 1990. The Metlund D'MAND System has been tested and approved by the Oak Ridge National Laboratories (DOE funded) to save both energy and water. In the US, the Metlund D'MAND Systems have received several awards and also receive rebates from water utilities in the country. They are GreenSpec Listed and receive LEEDS building credits for new construction. D'MAND Systems are also under EPA consideration for ENERGY STAR Credits.

In the last year ACT Inc. Metlund Systems have received the Australian SAI WATERMARK LISTING. This Australian testing procedure is the most difficult government testing for water and energy in the world. The Metlund D'MAND System is the only "on demand" hot water distribution system to receive the WATERMARK LISTING.

ACT Inc. Metlund Systems has entered into a partnership distribution agreement with Diamond-Shimmer/ Marbletrend Kitchen & Bath Manufacturer, headquartered in Melbourne Australia. Marbletrend is one of Australia's leading suppliers of kitchen & Bath products for residential and commercial use. www.marbletrend.com.au/gothotwater

Larry Acker, CEO and Donna-Marie, President, met with the principals of Marbletrend and several of the Governmental Agencies of Australia the end of January to review introducing the Metlund D'MAND System into their water and energy regulations. Attending the meetings were one of Australia's largest builders, Masterton Homes.

Australia is currently in a major drought and reviewing all water savings programs that are proven to save both energy and water. The government of Australia sets the regulations for energy and water use through the Dept. of Energy Utilities and Sustainability, Sydney and Melbourne Water Agencies and the NSW Government Initiatives. Because of these controls, decisions can be made and regulations put into place rapidly.

It is estimated that sales for export of Metlund D'MAND Systems to Australia in the next 16 months will be between 40,000 to 60,000 D'MAND Systems. This will represent additional sales of \$8,000,000 to \$10,000,000 for ACT Inc. Metlund Systems.

ACT Inc. will also introduce other energy savings products in the next year to the US, Canada and Australia. Heat Traps should be ready for shipment sometime in the next 6 months.



U.S. Department of Energy
Energy Efficiency and Renewable Energy

TRIZ or How Contradictions Lead to Innovation

E-3 News and Views



Metalforming Controls gives and gets good Press

Dr. Redmond Clark coauthors an article in the July 2004 issue of Metalforming Magazine with the 2004 E-3 Energy Saver Awardee, Dr. Evangelos Liasi, director of engineering at Ford Motor Co., Allen Park, MI.

<http://archive.metalformingmagazine.com/2004/07/FordWavesBye.pdf>

Funding Mailing Lists

www.fedgrants.gov

The Western Regional Office website includes lots of useful funding information. For monthly summaries of funding opportunities and other funding resources, go to:

http://www.eere.energy.gov/regions/western/financial_opps.html.

If anyone you know would like to sign up to receive these electronic funding newsletters, have them send an e-mail request to laurie.brown@ee.doe.gov. Include subscriber's e-mail address in the body of the message.

Excerpts from the I&I Newsletter

AVA Technologies

After much successful thermal testing, including a continuous 78 hour thermal run, I&I grantee AVA Technologies is showing excellent progress on its mass production process for photovoltaic modules. Substrate load locks, to transport substrates in and out of the system's vacuum chamber, will be installed by February, allowing film deposition testing. Additionally, AVA received a three-year renewal on its related NREL-sponsored efforts, which provide important processing knowledge for the system's development. AVA plans to host a site visit in March from its commercial partner and several DOE and GFO representatives.



Contradiction, or conflict, is at the heart of TRIZ (an acronym from Russian for The Theory of Inventive Problem Solving). The founder of TRIZ more than 60 years ago, Genrich Altshuller felt that problem solvers should

not eliminate obstacles, but actually look for them and use them in a new idea generation process.

While most problem solvers shy away from obstacles and try to eliminate them or develop a work around solution, TRIZ focuses on leveraging the conflicts and potentially incorporating them into the solution.

TRIZ holds that a system has a specific useful function, and anything that does not contribute to that function works against the system. TRIZ looks at both the positive and negative functional relationships within a system, identifying contradictions and unproductive relationships. The concept of functionality can cross industries, applying to problems ranging from technical problems to business planning to how to negotiate the purchase of a new car.

TRIZ also strives to identify and utilize "resources" fully. TRIZ defines a resource as anything in a system that is not being used to its fullest potential to contribute to the functionality of the system. All resources must be looked at for their potential contribution. TRIZ works to identify all resources and harness their use into improving functionality. Nothing is off limits. In TRIZ, creativity is harnessed through a holistic, yet structured and integrated approach to problem solving and innovation. In effect, TRIZ "synchronizes" the minds of any team to attack a problem holistically.

It uses knowledge gained from the extensive study of worldwide patents, the history of technology and its evolution, the psychology and sociology of people, and the study of markets.

TRIZ has been systematized, and there is now software support available.

TRIZ is in effect, the science of innovation. Teachable, rapid, and comprehensive.

Abstracted from an article in "The Manufacturer", December 31, 2003.

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**Masood Akhtar
invites E-3
members to
consider
opportunities**

The Center for Technology Transfer (CTT) is soliciting companies with energy efficient technologies that are NOT presently being marketed in Wisconsin. The goal of this solicitation is to "migrate" energy saving technologies into Wisconsin that are commercially available in other locales, but are new to Wisconsin industrial, commercial or residential markets.

Eligible technologies must:

- 1) Show an improvement in energy efficiency of electricity, natural gas or propane use, compared to the current industry standard
- 2) Be commercially available with satisfactory technical and economic performance, demonstrated at a minimum of two installations
- 3) Must be sold and serviced by a legal entity holding, or in the process of obtaining, the patent(s) or distribution rights in Wisconsin.

For companies with eligible technologies, CTT can offer:

- » Guidance in assessing the product's market potential in Wisconsin
- » Access to a statewide network of energy professionals and industry clusters that can help you target product promotion
- » Assistance with qualifying the product for incentives from Wisconsin's Focus on Energy program
- » Financial assistance for commercialization costs in Wisconsin in the form of a loan or equity investment of up to \$250,000 from the CTT.

To find out if your technology qualifies, send a one to two page summary addressing the three eligibility criteria. An existing fact sheet that addresses the three criteria adequately may be substituted. Send your information to [Doug Presny](mailto:dpresny@cttinc.org) at dpresny@cttinc.org.

Guest Author Series

E-3 presents the third in a series of articles by Dennis Gerschick, CFA, Attorney, CPA, VenCap Advisory Group.

Use of Intermediaries©



Many start-up and early-stage private companies try to raise capital from private investors because they cannot obtain a bank loan. However, as a practical matter, it is often difficult because the principals simply do not know enough potential sources of capital. Entrepreneurs often turn to their "family and friends" but in many cases they

cannot raise the entire amount needed. In a situation like this, a company might be tempted to turn to an "intermediary". An intermediary acts as the middleman between the company and potential investors. It is surprising how many people refer to themselves as "investment bankers" and who promise private companies that they have the necessary connections to raise the desired capital. Some companies may be so desperate for money that they will believe any story presented to them and want to believe the promises made by intermediaries. This article will address some of the issues a company should consider when dealing with an intermediary.

It is very important for the company to evaluate any intermediary before hiring them. This includes reviewing their track record for raising money, their experience and expertise, and their reputation. Do they have any background or training in finance, accounting, law, valuing private companies, structuring investments, etc.? Have they successfully raised the capital for other companies? Have other companies had disputes with the intermediary? Has the intermediary ever been sued by investors for misleading them? The best defense is always "know who you are dealing with."

To minimize the likelihood of a dispute, it is often advisable to put the agreement in writing. The written agreement should address certain issues explicitly. First, will the relationship be exclusive or non-exclusive? I believe the company should demand a non-exclusive arrangement for several reasons. One, intermediaries are typically compensated with a success fee; that is, the intermediary is compensated when they have brought investors to the table who actually invest in the company. Having a non-exclusive arrangement gives the intermediary an incentive



to find qualified investors as quickly as possible. However, intermediaries may argue that they will have to invest some period of time in order to study the company and the industry and prepare marketing materials or some kind of information package regarding the company that they will then present to potential investors. I believe that if the company must give an exclusive arrangement to an intermediary, the exclusivity should last for a relatively short period of time because the intermediary should be able to produce quickly or it is likely that they will not be able to perform.

Many intermediaries lead companies to believe that they have access to a “stable of sophisticated investors.” Does the intermediary really have established relationships with potential investors? What is the basis for the relationship? Have the investors invested in other deals arranged by the intermediary? As a practical matter, many intermediaries simply get companies to sign an exclusive arrangement and then the intermediary cold calls venture capital funds. If an intermediary is cold calling venture capital funds, is the intermediary really providing a valuable benefit and, if so, what is the value of that benefit?

An important issue is: how should any intermediary be compensated? Most intermediaries want to receive a percentage of the capital that is raised. The key question is: what percentage? The percentages typically vary depending upon the amount that is raised and whether the amount is contributed as debt or equity. Many intermediaries also want to received stock immediately or an option to acquire stock.

The written agreement should also set forth the term of the agreement and may include a termination provision upon written notice being provided to the other party. The agreement may provide that either party can terminate the written agreement upon giving the other party the specified number of days prior written notice. The agreement may provide that the agreement can be terminated “with cause” as such term is defined in the agreement or without cause and different consequences may be attached to each.

The agreement should also specify the services that are to be rendered by the intermediary. The agreement should perhaps include a provision that prohibits a “general solicitation” of investors. The agreement may also prohibit advertising and the agreement may prohibit that intermediary from placing an ad in the Wall Street Journal or any other publication soliciting investors.

Has a competitor engaged the “intermediary” to act as a “mole” to learn confidential information about the company?

The agreement may also include restrictive covenants including a non-disclosure provision.

Intermediaries are salesmen. Like most salesmen, intermediaries are going to be tempted to “puff” and say things to induce a potential investor to make the investment so the intermediary earns a fee. The intermediary should indemnify the company if the company is sued because of misrepresentations made by the intermediary. The company also can help to protect itself by having written agreements that include a representation from the investor that the investor has not relied upon any oral statements made by the intermediary and instead the investor has relied upon their own, independent due diligence, they have had the opportunity to ask questions and received answers to their satisfaction, and they received such written information as they deem appropriate.

Another question is: should a company use an intermediary? The answer may depend upon several factors. First, who will be the investors? Some venture capital funds will not invest in a deal if an intermediary is involved; however, this is not an issue with most venture capital funds. If the company is seeking funds from family and friends and other “small investors,” they may not object to a reasonable fee being paid to an intermediary.

Intermediaries are like lawyers, the quality varies substantially. Some intermediaries do provide a benefit to the company by locating qualified investors and playing a helpful role in closing the deal. However, many intermediaries are not qualified and the value they add is questionable. In fact, they may hurt a company by presenting a very unprofessional image. The old adage “you are the company you keep” is certainly applicable. Every party that the company does business with reflects on the company so a “shady intermediary” may not only present a poor image on behalf of the company, but may also be the root cause of litigation. Similarly, a competent, sophisticated intermediary may reflect well on the company. Choose wisely.

In summary, when companies are desperate for money, they often will do anything to get it. Companies can help themselves by dealing with reputable intermediaries and getting a well-drafted agreement with them.

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